

Introduction to Multimedia Applications CT801-4-0-OIMA



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VIDEO

Topic & Structure of the lesson



Definition



Characteristics of Video



Sources of Video



Advantages and Disadvantages of Video



File Size Calculation



Video Capture Card



Quality of Video

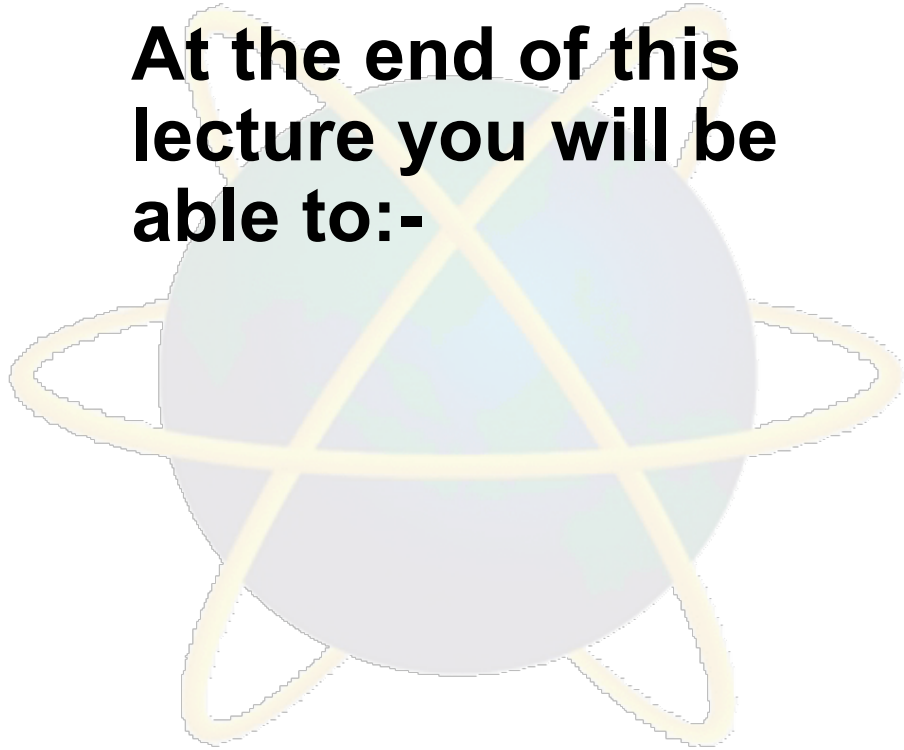


Video Software



Video File Format

Learning Outcomes



At the end of this lecture you will be able to:-



Identify video concepts and formats.



Calculate a compressed video file.



Explain the technical limitations in video

Key Terms you must be able to use

If you have mastered this topic, **you should be able to use the following terms correctly in your assignments and exams:**

MPEG

VCD

AVI

MOV

Digital Video
Technology

Definition of Video

A stream of individual frames that contain both audio and visual images

When played at a fast rates, the images contained in each frame will seem to have life-like motion

Video, unlike animation, usually made up of realistic images.

The most common forms of video – movies and television

Movies on film are run at 24 frames per second.

Television uses 30 frames per second

Computer animations can be effective at 12 to 15 frames per second

Digital video can consist of 2D or 3D animations

Sources of Digital Video

VCD movies

Movie clips in
Commercial
CD-ROM

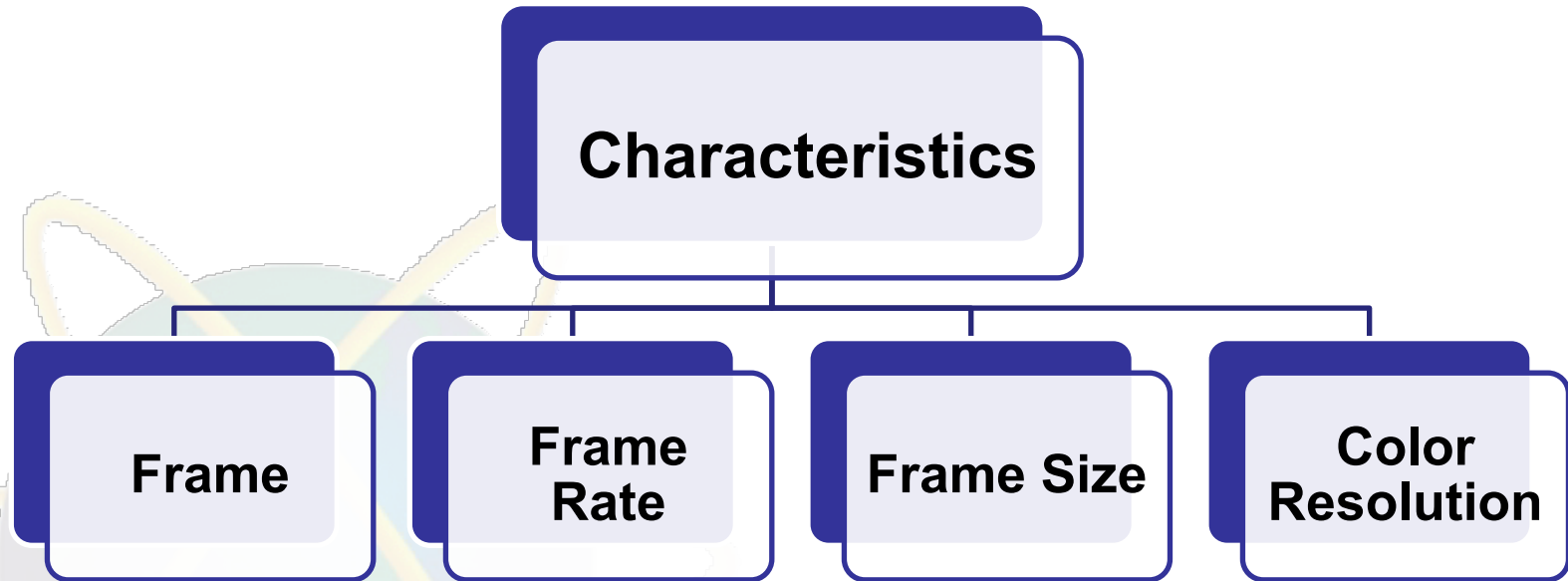
Television

Camera

Recordings of
live action using
video camera

Other analogue
sources such
as videotape

Characteristics of Video



Advantages of Digital Video

Able to randomly access to any part of the video. Analog video like video tape is linear, if user want to edit it, need to continually rewind, pause, and fast-forward the tape

Video can be compressed

Video can be copied and reproduced without loss of quality.

Video can be manipulated or edited easily.

Video can be transmitted over computer networks.

Special effects can be added to video

Other media (audio, graphics) can be incorporated

Disadvantages of Digital video

Video requires an enormous amount of computer storage space.

Video requires high transfer rates.

Expensive to produce

Requires special equipment - lights, cameras, editing tools



Digital Video Capture



Analogue video can not be played in a computer



Video must be digitized



Video capture: Process of transforming a video input signal (from a VCR or camera) into a series of graphic images that can be stored on a computer



To capture video, we must have a video capture card



There is ADC and DAC in video capture card



To capture video, plug a video camera or videocassette recorder (VCR), into a video capture card in a computer



Once the video device is connected to the video capture card, user can begin recording.



File Size Calculation

To estimate the size of a digital sound in bytes, use the following formula:

- **Video Size** = **Frame size** * **Frame Rate** * **Color Resolution (Bit)** * **Time (seconds)**

What is the file size ?

- For a video clip in 24-bit color and quarter screen or 320 x 240 pixels, 15 frames per second and for 30 seconds

320 x 240 x 24 bit x 30 seconds x 15 fps
= 829,440,000 Bits (Note that this does not include audio)

Video Software



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Windows Live Movie Maker

Movie Masher (Open Source)
<http://www.moviemasher.com/>

Adobe Premiere

Apple's QuickTime (or
QuickTime for Window)

Microsoft Windows Media
Player

Web tools for video editing

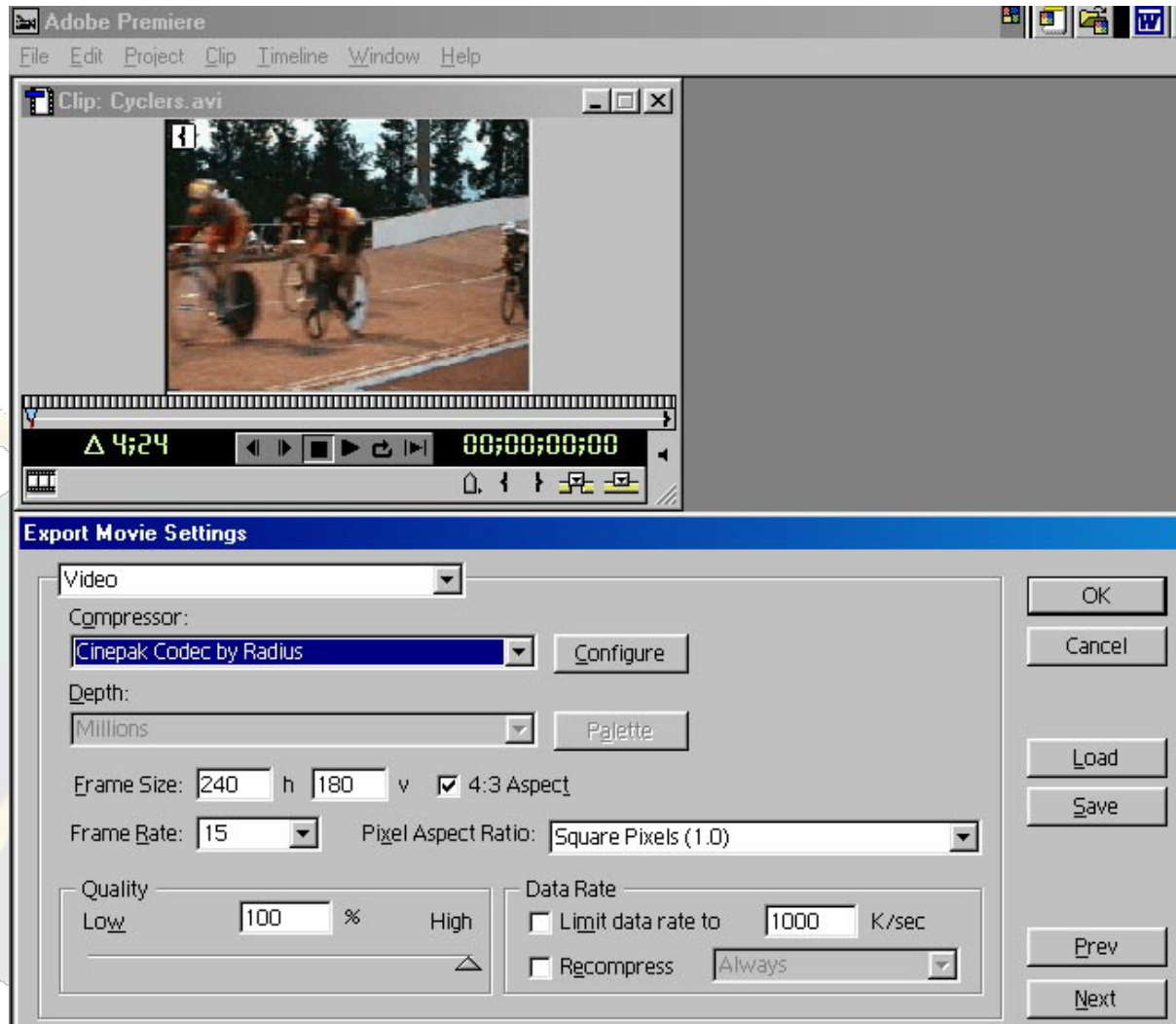
onetruemedia.com

sproutvideo.com

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Video File Format

*.avi (Audio-Video Interleaved)

*.mov (Quicktime Movie)

*.realVideo

*.mpeg (Motion Picture Experts Group)

- open standard
- version 2 is industry video standard
- MPEG 1 (for 352 pixels x 240 pixels x 30 frames per second (normally scaled up to 640x480))
- MPEG 2 (Already in use for DVD, satellite TV, HDTV, it is for full-screen video at 1024 x 768 x 30 fps)
- MPEG 4 (Much greater compression than existing standards, Optimized for streaming media. It is intended for low-bandwidth multimedia applications)

.dv (Digital Video)

- Used in digital video (DV) cameras
- Technically almost the same as MPEG-2

Quality of Video

Factors influence the quality of video:

The speed of CD-ROM or DVD drive:

- Video files are extremely large.
- If CD-ROM and DVD drives are slow at transferring data compared to a computer's hard disk or RAM (memory).
- So playback can become jerky.
- Besides, the processor in the multimedia player has to decompress the video as it plays, slowing things down even further.

The performance of the video-capture card:

- Video capture card (or called video capture board / frame grabber):
- The higher the picture resolution it can capture, the closer the digitized images will be to the footage on the original video tapes
- Choose proper video capture card: Affect video quality

Quality of Video

Factors influence the quality of video:

The capability of computer components:

- How many times per second the video image is updated: television runs at 30 frames per second, but most multimedia video runs at only 10 to 15 frames per second.

Size (1/4 screen? full screen?)

Frame rate (15 frame/s? 30 frame/s?)

Color resolution (8 bits? 24 bits? Most video playback reduces video from millions of colors to only 256)

Content (For scenery – less frame rate; For great deal of motion – higher frame rate)

Compression (high? Low?)

BYTE vs BITS

(1 byte = 8 bits)

Bits, kilobits (Kbps), and megabits (Mbps) are most often used to measure data transfer speeds.

- This may refer to how fast you are downloading a file, or how fast your Internet connection is. For example, if you are downloading a file on cable modem, your download speed might be 240Kbps.
- This is much faster than a dial-up modem, which maxes out at 56Kbps.

Bytes, on the other hand, are used to measure data storage.

- For example, a CD holds 700MB (megabytes) of data and a hard drive may hold 250GB (gigabytes).
- The other important difference is that **bytes contain eight bits of data**. Therefore, a 240Kbps download is only transferring 30KB of data per second.
- However, kilobytes per second is not as commonly used as kilobits per second for measuring data transfer speeds.
- After all, using kilobits per second (Kbps) makes your connection sound eight times faster

Quick Exercise

Calculate the file size for the files below:



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MVI_7218.AVI

File A

Video:	Audio:
320 x 240 pixels	11KHz
15fps	8bit
32bit	Stereo
15 minutes	



The School Of Rock.avi

File B

Video:	Audio:
1024 x 768 pixels	48KHz
24fps	8bit
32bit	Stereo
0.5 hour	

FORMULA

Formula:

- **Video Size** = Frame size * Frame Rate * Color Resolution (Bit) * Time (seconds)
- **Audio Size** = Sampling rate (Hz) * duration of recording (seconds) * quantization or resolution (bits) * types of channel (1 for mono and 2 for stereo)
- **File Size** = Video Size + Audio Size

FILE A



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Video

- Frame Size : 320 x 240 px
- Frame Rate : 15 fps
- Color Resolution : 32 bit
- Time : 15 x 60 = 900 seconds
- Video Size = 320 x 240 x 15 x 32 x 900
- Answer = 33177600000 bits

Audio

- Sampling Rate : 11 x 1000 = 11000 Hz
- Duration : 15 x 60 = 900 seconds
- Quantization : 8 bit
- Channel : stereo = 2
- Audio Size = 11000 x 900 x 8 x 2
- Answer = 158400000 bits

Total File Size :

- Video + Audio = 33177600000 + 158400000
- Answer = 33336000000 bits

FILE B



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Video

- Frame Size : 1024 x 768 px
- Frame Rate : 24 fps
- Color Resolution : 32 bit
- Time : 30 x 60 = 1800 seconds
- Video Size = 1024 x 768 x 24 x 32 x 1800
- Answer = 1087163596800 bits

Audio

- Sampling Rate : 48 x 1000 = 48000 Hz
- Duration : 30 x 60 = 1800 seconds
- Quantization : 8 bit
- Channel : stereo = 2
- Audio Size = 48000 x 1800 x 8 x 2
- Answer = 1382400000 bits

Total File Size :

- Video + Audio = 1087163596800 + 1382400000
- Answer = 1088545996800 bits

Quick Review Question

01

Define the
term video

02

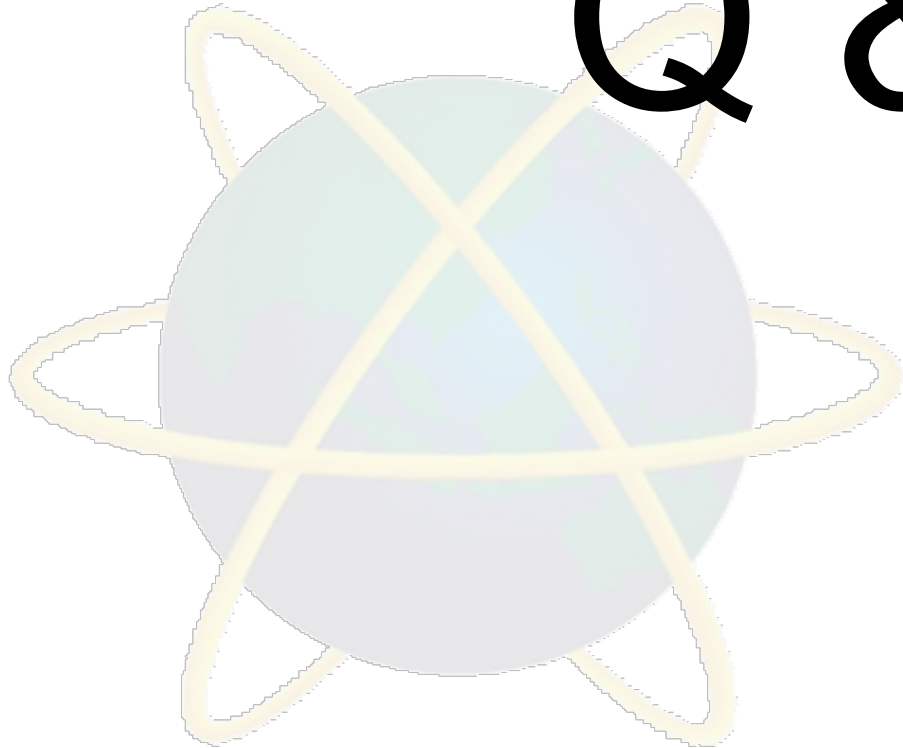
Identify the
characteristic
of video

03

List 5 file
format used
in video

Question and answer session

Q & A



Next Session

Applications of Multimedia

